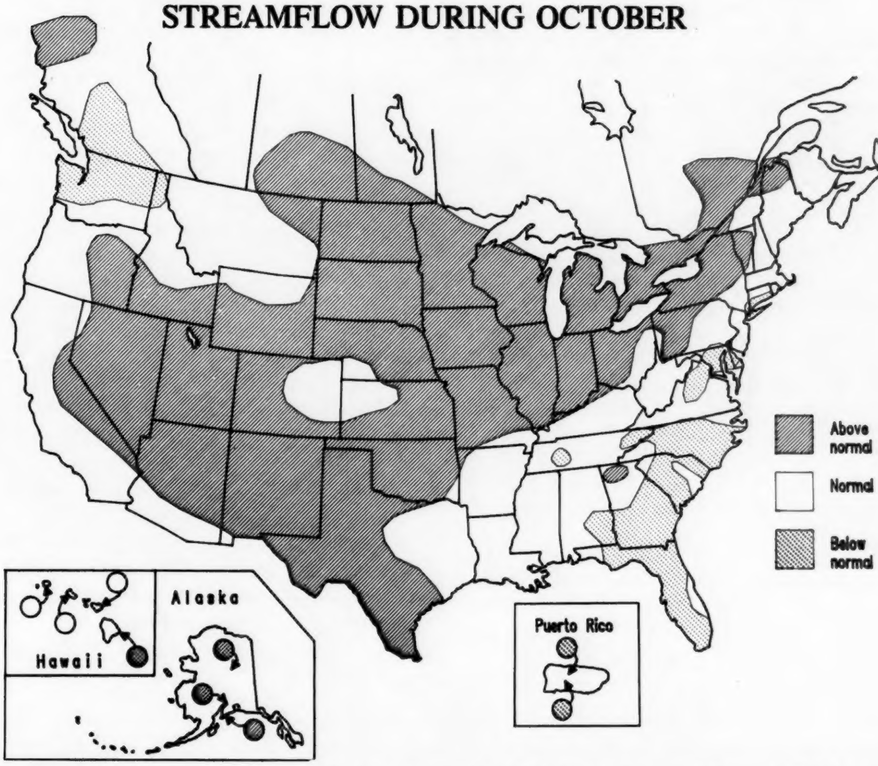
National Water Conditions

UNITED STATES
Department of the Interior
Geological Survey

CANADA
Department of the Environment
Water Resources Branch

OCTOBER 1986

STREAMFLOW DURING OCTOBER



A major fall flood in the central Midwest affected large parts of Oklahoma, Kansas, Missouri, Illinois, and parts of adjacent States. As much as 25 inches of rain were reported in north-central Oklahoma from September 29 to October 3. Peak discharges on many rivers and streams exceeded both the peak of record and the 100-year flood. Devastating floods also occurred in south-central Alaska with the areas around Seward, Bradley Lake (at head of Kachemak Bay, east of Homer) and the Susitna River valley the hardest hit. Damages were estimated at $15 to $20 million in Alaska and $100 million in Chicago and its suburbs.

Streamflow was in the normal or above-normal range at 85 percent of the 192 index stations with below-normal streamflow persisting in large parts of the Pacific Northwest and the Southeast. Monthly mean flows were highest of record for October in parts of 10 States and lowest of record for the month in parts of New York, Florida, and Puerto Rico.

The combined flow of the 3 largest rivers in the lower 48 States—St. Lawrence, Mississippi, and Columbia—averaged a record-breaking 1,351,500 cfs during October, exceeding the 1973 high of 928,800 cfs by 45 percent, with the flows of all 3 rivers in the above-normal range, and the flows of the St. Lawrence and the Mississippi also setting records for the month.

STREAMFLOW CONDITIONS DURING OCTOBER 1986

A major fall flood in the central Midwest affected large parts of Oklahoma, Kansas, Missouri, Illinois, and parts of adjacent States—the direct result of runoff from torrential rains associated with a stationary cold front and the remnants of Hurricane Paine. As much as 25 inches of rain were reported in north-central Oklahoma September 29 to October 3. Residents of many communities in Oklahoma were forced to evacuate their homes due to the flooding. Flows in the Cimarron, Neosho, Chickaskia, Baron Fork, Bird Creek, Caney, Arkansas, Verdigris, North Fork Red, Salt Fork Red, and Washita Rivers nearly equaled or exceeded previous recorded peaks. The flooding was especially severe on the Arkansas River in Oklahoma and in the Osage River basin in southeastern Kansas and west-central Missouri. Flood peaks near the end of September and early October were highest of record at several locations, and much of the flooding in northeast Oklahoma was the result of releases from the many reservoirs in the area. In Illinois, severe flooding occurred in the Des Plaines River basin where peak flows with recurrence intervals of 75 years were reported. Rainfall during the last 7 days of September totaled over 12 inches at two locations in that basin. Four deaths were attributed to the flooding, and damage estimates of $30 million in the Chicago area and $70 million in the outlying suburbs were reported.

In north-central Montana, runoff from as much as 6 inches of rain during an 8- to 12-hour period on September 24 caused severe flooding in the Milk River basin. Peak discharges on Battle Creek, Peoples Creek, Beaver Creek, and Willow Creek, major tributaries to the Milk River, had recurrence intervals of about 100 years or more. On the main stem of the Milk River, peak flows were about a 40- to 50-year event. One life was lost, and considerable property and crop damage occurred as a result of the flooding.

In south-central Alaska, runoff from record 24-hour rainfalls on October 10 and 11 caused flooding that was highly variable but in some places severe and devasting. The hardest hit areas were at Seward, the Bradley Lake area (at head of Kachemak Bay, east of Homer) and in the Susitna River valley. Damage estimates of $15-20 million were reported, about $4-5 million of which was suffered by the Alaska Railroad. Selected data on stages, discharges, recurrence intervals, and gaging station locations for the floods in Alaska and for those described in the preceding paragraphs are given in the accompanying table and maps on pages 4, 5.

Streamflow generally increased in Hawaii, Washington, Oregon, Nevada, New Mexico, North Dakota, South Carolina, and in a broad area from Louisiana and Oklahoma northeastward to Maine. Monthly mean flows decreased in Virginia, New Brunswick, Rhode Island, New Hampshire, and parts of Alberta and Saskatchewan, and were variable elsewhere. Streamflow was in the normal or above-normal range at 85 percent of the 192 index stations compared to 81 percent in those ranges for last month. Monthly mean flows at index sites were highest of record for October in parts of at least 10 States and lowest of record for the month in parts of Puerto Rico, Florida, and New York. For example, monthly mean discharge of Big Sioux River at Akron, Iowa—draining 8,424 square miles in South Dakota, Minnesota, and Iowa, of which about 1,487 square miles is probably noncontributing—was 4,000 cubic feet per second (cfs), highest for October in 58 years of record and nearly 17 times the median flow for October. (See table of new extremes on page 3.) The map on page 7 indicates areas where streamflow has persisted in the above- or below-normal range for at least 2 consecutive months and also areas where streamflow was in the above- or below-normal range during October after being in a different range during September.

Elsewhere in the Nation, flash flooding occurred during the first 4 days of the month in central and northern Indiana with near bankful and lowland flooding along the larger streams in the State. In Iowa, despite the large volume of rainfall and the record October runoff volume on many streams throughout the State, serious flooding did not occur. In Utah, the elevation of Great Salt Lake was 4,210.95 feet above National Geodetic Vertical Datum of 1929 at the end of October, up 0.25 foot above the low reached on September 15, 1986, and only 0.90 foot below the record high elevation of 4,211.85 feet recorded June 3-8, 1986.

CONTENTS

NEW EXTREMES DURING OCTOBER 1986 AT STREAMFLOW INDEX STATIONS

Station number	Stream and place of determination	Drainage area (square miles)	Years of record	Previous October extremes (period of record): Monthly mean in cfs (year)	Previous October extremes (period of record): Daily mean in cfs (year)	October 1986: Monthly mean in cfs	October 1986: Percent of median	October 1986: Daily mean in cfs	October 1986: Day
	LOW FLOWS								
01309500	Massapequa Creek at Massapequa, N.Y.	38	49	2.37 (1965)	1.7 (1965)	1.90	24	1.30	1
02358000	Apalachicola River at Chattahoochee, Fla.	17,300	58	5,319 (1954)	5,010 (1954)	5,200	48	. . .	. .
50038100	Rio Grande De Manati at HWY 2 near Manati, Puerto Rico.	197	16	196 (1982)	71 (1977)	170	33	109	19
	HIGH FLOWS								
03234500	Scioto River at Higby, Ohio.	5,131	56	5,043 (1979)	15,300 (1975)	5,080	668	19,300	7
04084500	Fox River at Rapide Croche Dam near Wrightstown, Wis.	6,150	90	8,943 (1938)	18,200 (1938)	13,230	594	14,641	16
04121500	Muskegon River at Evart, Mich.	1,450	54	1,569 (1954)	2,400 (1951)	2,383	386	3,980	1
04264331	St. Lawrence River at Cornwall Ont. near Massena, N.Y.	298,800	126	306,000 (1973)	311,000 (1972)	323,900	128	341,000	29
05288500	Mississippi River near Anoka, Minn.	19,100	56	18,180 (1965)	29,700 (1984)	20,750	382	35,400	1
05331000	Mississippi River at St. Paul, Minn.	36,800	88	34,760 (1903)	58,200 (1968)	37,740	578	64,700	1
05407000	Wisconsin River at Muscoda, Wis.	10,300	73	19,460 (1972)	43,000 (1972)	25,410	468	45,900	1
05446500	Rock River near Joslin, Ill.	9,542	47	13,470 (1972)	28,000 (1954)	17,100	520	23,300	4
05464500	Cedar River at Cedar Rapids, Iowa.	6,510	84	9,556 (1965)	28,500 (1965)	10,800	723	22,000	18
05480500	Des Moines River at Fort Dodge, Iowa.	4,190	56	4,270 (1982)	6,690 (1965)	5,995	1,733	11,200	13
06485500	Big Sioux River at Akron, Iowa.	8,424	58	2,280 (1982)	4,580 (1982)	4,000	1,674	9,170	1
06800500	Elkhorn River at Waterloo, Nebr.	6,900	66	2,440 (1982)	15,200 (1965)	2,750	538	5,020	12
06810000	Nishnabotna River above Hamburg, Iowa.	2,806	59	3,555 (1973)	15,100 (1973)	5,060	1,045	22,900	12
06934500	Missouri River at Hermann, Mo.	528,200	89	221,900 (1973)	353,000 (1969)	289,600	482	547,000	5
07289000	Mississippi River at Vicksburg, Miss.	1,144,500	58	562,000 (1979)	823,000 (1945)	905,000	307	1,176,000	21

Precipitation was generally above normal in the eastern two-thirds of the Nation, but large areas in the Northeast remained below normal. (See maps on page 6.) Monthly mean flow of Conecuh River at Brantley, Alabama, was well above the low for the 1986 water year reached in August, but flows at that site remained in the below-normal range for the 7th consecutive month. (See graph on page 14.)

The combined flow of the three largest rivers in the conterminous United States—Mississippi, St. Lawrence, and Columbia—averaged a record-breaking 1,351,500 cfs during October, 111 percent above median, 93 percent above last month, and 45 percent greater than the previous record of 928,800 cfs set in 1973. Monthly mean flow of the St. Lawrence River near Cornwall, Ontario, was the highest for October in 126 years of record, averaging 323,900 cfs (28 percent above median), and was above the normal range for the 24th consecutive month. Similarly, the monthly mean flow of 905,000 cfs and the daily mean flow of 1,176,000 cfs on October 21 at the Mississippi River near Vicksburg were highest for the month in 58 years of record. Hydrographs for both the separate flows and combined flow of the "Big Three" are shown on page 8 with Great Lakes Hydrographs below them.

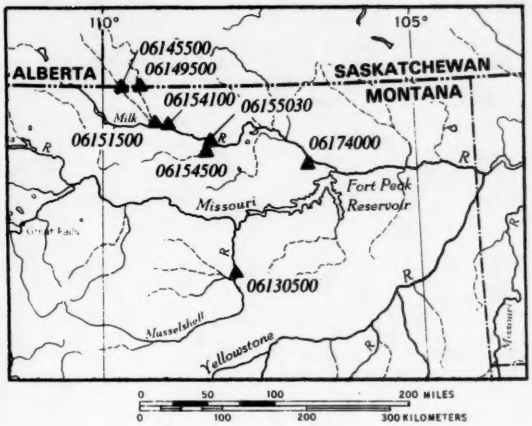
Contents of 87 percent of reporting reservoirs were near or above average for end of October. The only reservoirs with both below-average contents for the end of the month and significant declines in contents during the month were Lake Cushman (Washington) and Pend Oreille Lake (Idaho). Contents of all reservoirs in Oklahoma were above the normal maximum at end of October.

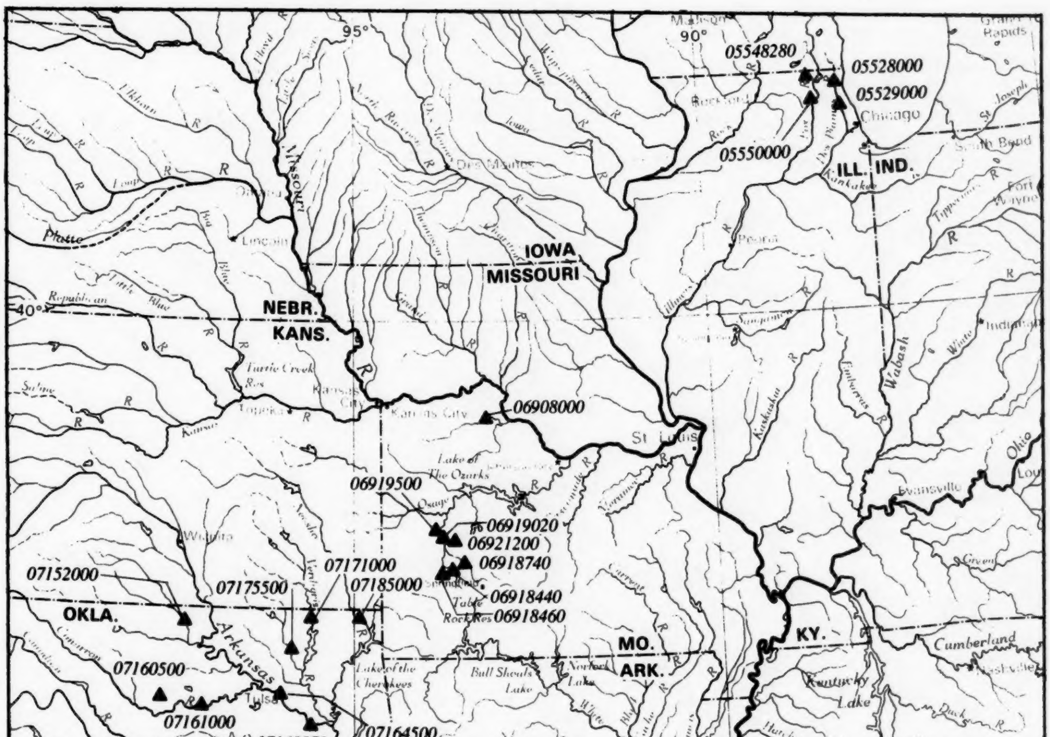
FLOOD DATA FOR SELECTED SITES IN ALASKA, ILLINOIS, MISSOURI, MONTANA, AND OKLAHOMA, SEPTEMBER TO OCTOBER 1986.

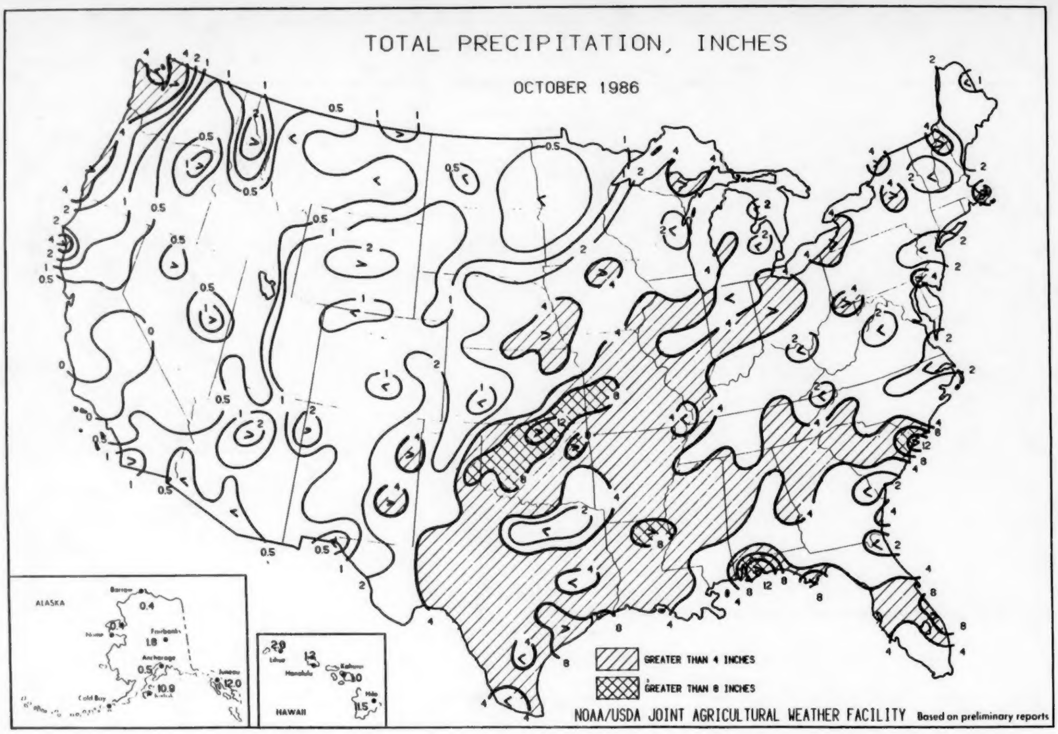
WRD station number	Stream and place of determination	Drainage area (square miles)	Period of known floods	Maximum flood previously known: Date	Maximum flood previously known: Stage (feet)	Maximum flood previously known: Discharge (cfs)	Maximum during present flood: Date	Maximum during present flood: Stage (feet)	Discharge: Cfs	Discharge: Cfs per square mile	Recurrence interval (years)
	ALASKA										
	SOUTH-CENTRAL ALASKA										
15239000	Bradley River near Homer	[a]54	1958-	Aug. 10, 1979	[b]9.46	6,020	Oct. 10	10.83	[a]8,800	163	100
15292700	Talkeetna River near Talkeetna	2,006	1964-	Aug. 10, 1971	16.35	67,400	11	17.38	[a]73,000	36.4	50-100
15292780	Susitna River at Sunshine	[a]11,100	1971, 1981-	Aug. 10, 1971	[b]62.10	[c]200,000	11	[a]16.5	[a]180,000	16.2	(d)
15293000	Caswell Creek near Caswell	19.6	1963-	August 1965	12.89	207	11	(d)	350	17.9	*1.2
15293700	Little Willow Creek near Kashwitna	155	1980-	Aug. 12, 1985	13.30	2,100	11	15.25	7,400	47.7	(d)
15294025	Moose Creek near Talkeetna	52.3	1972-	July 10, 1981	26.73	2,500	11	31.8	3,400	65.0	*1.8
15294300	Skwentna River near Skwentna	2,250	1960-	June 9, 1977	15.09	51,600	11 or 12	17.3	[a]69,000	30.7	*1.1
15294345	Yentna River near Susitna Station	[a]6,180	1980-	Aug. 13, 1981	18.61	116,000	12	19.2	130,000	21.0	(d)
15294350	Susitna River at Susitna Station	19,400	1974-	Aug. 16, 1981	20.27	230,000	12	[a]23.3	320,000	16.5	*1.1
15294450	Chuitna River near Tyonek	131	1976-	Sept. 15, 1982	10.07	4,800	10	[a]16.4	[c]13,000	99.2	*2.1
	ILLINOIS										
	ILLINOIS RIVER BASIN										
05528000	Des Plaines River near Gurnee	232	1945-	Apr. 3, 1960	10.64	3,070	Sept. 27	11.95	3,550	15.3	75
05529000	Des Plaines River near Des Plaines	360	1940-	Apr. 2, 1960	8.56	4,670	Oct. 1	10.9	4,950	13.8	75
05548280	Nippersink Creek near Spring Grove	192	1966-	Feb. 20, 1971	13.03	2,430	Sept. 26	14.26	3,200	16.7	<75
05550000	Fox River at Algonquin	1,403	1915-	Apr. 6, 1960	[c]4.01	6,610	Oct. 1	3.99	6,200	4.4	30
	MISSOURI										
	LAMINE RIVER BASIN										
06908000	Blackwater River at Blue Lick	1,120	1922-33, 1938-	Nov. 18, 1928	41.25	54,000	Oct. 3	42.79	45,500	40.6	70
	OSAGE RIVER BASIN										
06918440	Sac River near Dadeville	257	1966-	Feb. 23, 1985	20.63	10,200	1	20.8	13,500	52.5	*1.3
06918460	Turnback Creek above Greenfield	252	1965-	Nov. 1, 1972	24.45	41,000	1	25.4	36,000	143	100
06918740	Little Sac River near Morrisville	237	1968-	Nov. 1, 1972	21.95	22,300	1	21.75	21,700	91.6	(d)
06919020	Sac River at Hwy J below Stockton	1,292	1973-	Feb. 23, 1985	24.91	11,100	1	24.62	14,800	11.5	(d)
06919500	Cedar Creek near Pleasant View	420	1923-26, 1948-	July 17, 1958	27.35	33,900	1	27.3	35,800	85.2	*1.1
06921200	Lindley Creek near Polk	112	1957-	May 5, 1961	23.60	28,000	1	23.32	31,900	285	*1.3
	MONTANA										
	MUSSELSHELL RIVER BASIN										
06130500	Musselshell River at Mosby	7,846	1929-	June 18, 1944	[f]14.43	18,000	Sept. 25	14.10	13,200	1.7	10
	MILK RIVER BASIN										
06145500	Lodge Creek below McRae Creek, at International Boundary	825	1951-	June 14, 1962	14.40	7,760	26	16.36	[c]9,000	10.9	>100
06149500	Battle Creek at International Boundary	997	1917-	Apr. 15, 1952	10.56	5,820	25	11.5	[c]7,000	7.0	>100
06151500	Battle Creek near Chinook	1,539	1905-21, 1984-	Mar. 31, 1918	[b]16.50	[a]12,000	25	24.2	19,300	12.5	>100
06154100	Milk River near Harlem	9,822	1960-	Apr. 19, 1965	5.44	6,600	30	26.4	[c]11,000	1.1	[a]40
06154500	Peoples Creek near Dodson	670	1952-73, 1981-	June 9, 1972	[g]11.94	3,940	25	15.65	7,100	10.6	95
06155030	Milk River near Dodson	11,192	1982-	July 12, 1983	16.56	2,350	26	30.19	13,000	1.2	50
06174000	Willow Creek near Glasgow	538	1953-	July 14, 1962	[h]21.70	12,400	30	21.88	5,100	9.5	95
	OKLAHOMA										
	ARKANSAS RIVER BASIN										
07152000	Chickaskia River near Blackwell	1,859	1935-	June 22, 1942	33.3	85,000	Oct. 3	34.28	56,800	30.6	11
07160500	Skeleton Creek near Lovell	410	1949-	May 16, 1957	34.58	75,200	3	36.78	51,100	125	37
07161000	Cimarron River at Perkins	17,852	1939-	May 17, 1957	[b]19.53	149,000	4	26.7	160,000	9.0	70
07164500	Arkansas River at Tulsa	74,615	1925-	Oct. 5, 1959	22.00	246,000	5	25.21	300,000	4.0	56
07165570	Arkansas River near Haskell	75,473	1972-	Nov. 6, 1974	17.30	108,000	5	22.77	260,000	3.4	(d)
07171000	Verdigris River near Lenapah	3,639	1938-	May 20, 1943	40.44	137,000	5	38.29	78,000	21.4	10
07175500	Caney River near Ramona	1,955	1935-	Oct. 3, 1945	30.12	38,500	5	31.12	120,000	61.4	(d)
07185000	Neosho River near Commerce	5,876	1939-	July 15, 1951	34.03	267,000	6	26.33	101,000	17.2	11

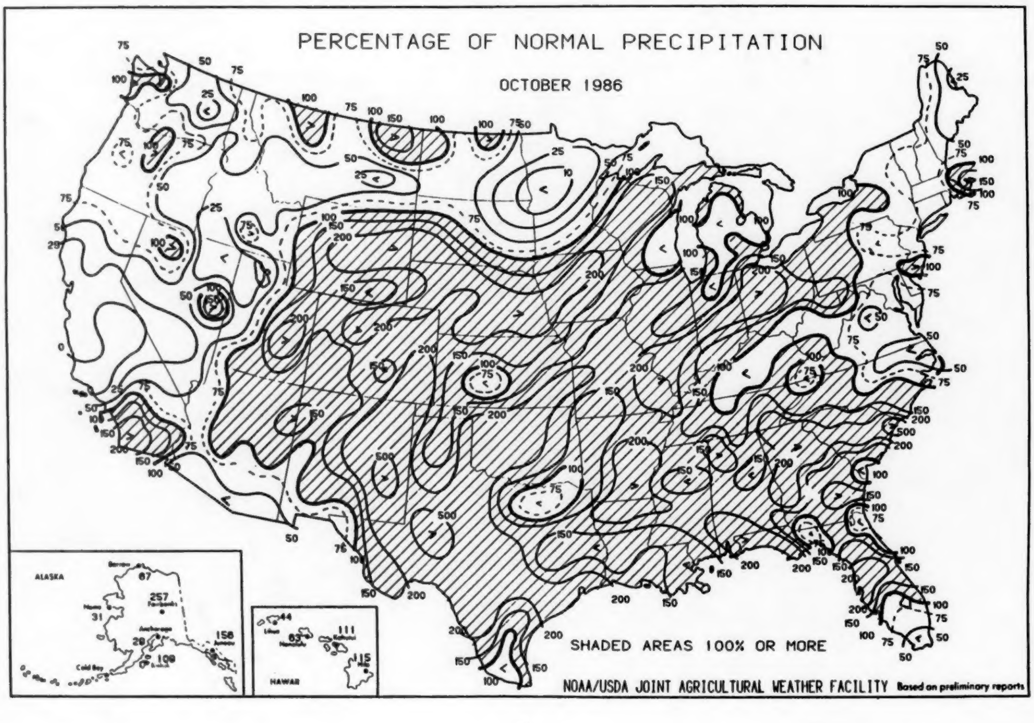
[a]about
[b]at different datum
[c]estimated
[d]unknown or not determined
[f]maximum gage height, 15.1 ft. Mar. 12, 1979, backwater from ice jam.
[g]maximum gage height, 17.05 ft. Mar. 29, 1952, backwater from ice.
[h]maximum gage height, 23.0 ft. June 21, 1974.
*approximate ratio of discharge to that of 100-year flood.

LOCATION OF SITES FOR WHICH FLOOD DATA ARE GIVEN IN ALASKA, MONTANA, AND THE CENTRAL MIDWEST

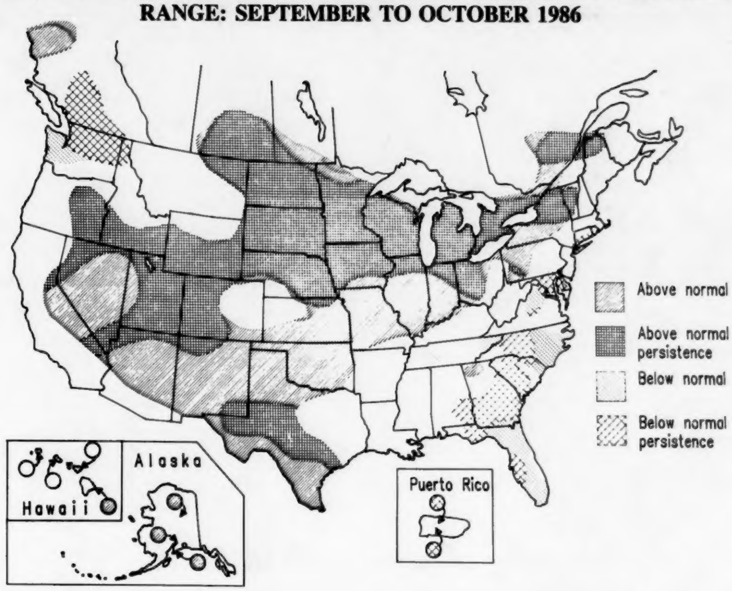





TOTAL PRECIPITATION, INCHES
OCTOBER 1986
GREATER THAN 4 INCHES
GREATER THAN 8 INCHES
ALASKA
HAWAII
NOAA/USDA JOINT AGRICULTURAL WEATHER FACILITY
Based on preliminary reports

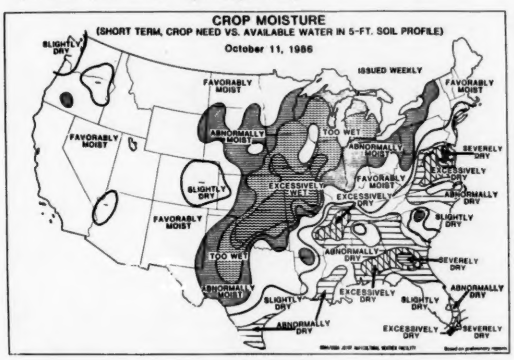

PERCENTAGE OF NORMAL PRECIPITATION
OCTOBER 1986
SHADED AREAS 100% OR MORE
ALASKA
HAWAII
NOAA/USDA JOINT AGRICULTURAL WEATHER FACILITY
Based on preliminary reports

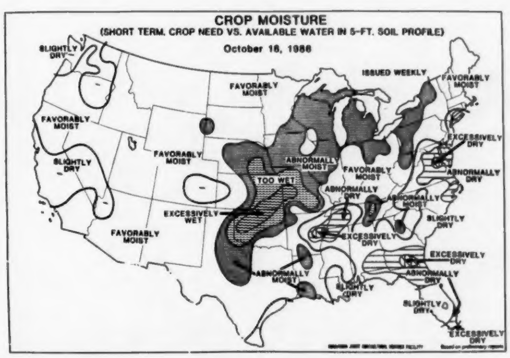
PERSISTENCE IN, OR MOVEMENT INTO, THE BELOW-NORMAL OR ABOVE-NORMAL FLOW RANGE: SEPTEMBER TO OCTOBER 1986

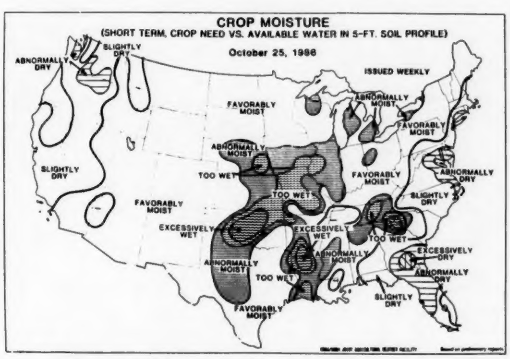


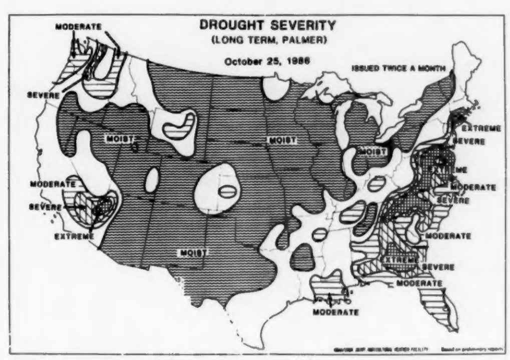
CROP MOISTURE AND DROUGHT SEVERITY

[*CROP MOISTURE* depicts short-term (up to about four weeks) abnormal dryness or wetness affecting agriculture. Responds rapidly, can change considerably from week to week, and indicates normal conditions at the begining and end of the growing season. *DROUGHT SEVERITY INDEX (PALMER)* depicts prolonged (months, years) abnormal dryness or wetness. Responds slowly, changes little from week to week, and reflects long-term moisture, runoff, recharge and deep perrolation, as well as evapotranspiration.]



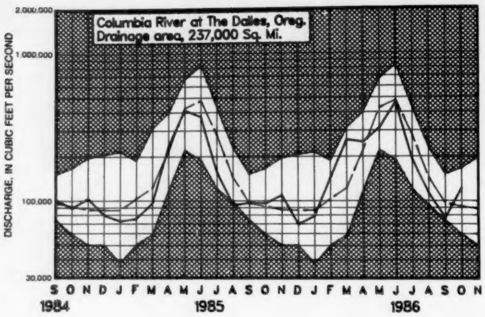


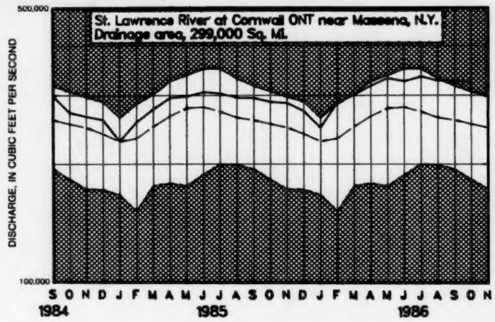


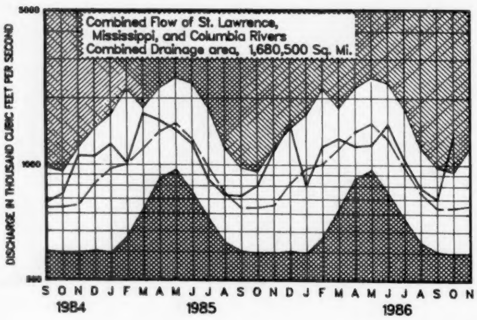


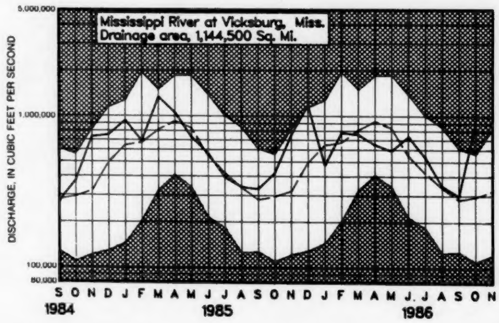
(From *Weekly Weather and Crop Bulletin* prepared and published by the NOAA/USDA Joint Agricultural Weather Facility)

MONTHLY MEAN DISCHARGE OF THE "BIG THREE" RIVERS

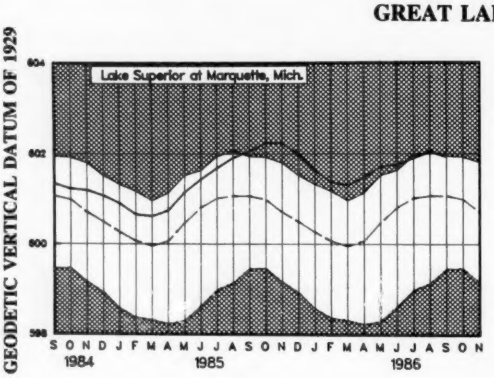


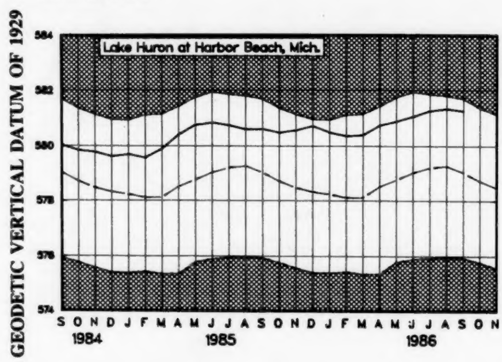


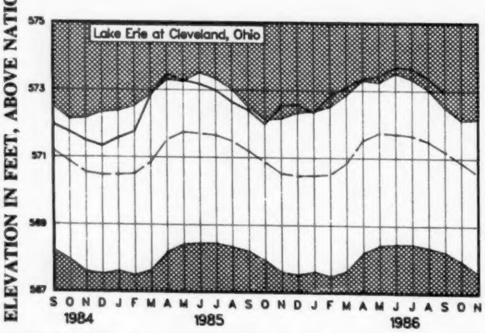


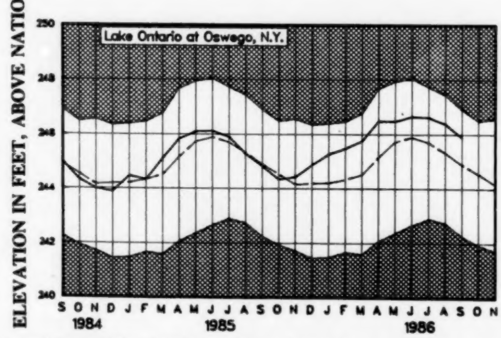


GREAT LAKES ELEVATIONS









Unshaded area indicates range between highest and lowest record for the month. Dashed line indicates median of monthly values for reference period, 1951-80. Heavy line indicates mean for current period.

FLOW OF LARGE RIVERS DURING OCTOBER 1986

Station number	Stream and place of determination	Drainage area (square miles)	Average discharge through September 1980 (cubic feet per second)	October 1986					
				Monthly mean discharge (cubic feet per second)	Percent of median monthly discharge, 1951–80	Change in discharge from previous month (percent)	Discharge near end of month		
							Cubic feet per second	Million gallons per day	Date
01014000	St. John River below Fish River at Fort Kent, Maine	5,690	9,647	4,512	94	−61	2,540	1,641	31
01318500	Hudson River at Hadley, N.Y.	1,664	2,909	2,680	191	+42	2,250	1,454	31
01357500	Mohawk River at Cohoes, N.Y.	3,456	5,734	5,020	194	+78	3,500	2,260	31
01463500	Delaware River at Trenton, N.J.	6,780	11,750	4,070	83	+12	3,720	2,404	31
01570500	Susquehanna River at Harrisburg, Pa.	24,100	34,530	14,910	140	+136	9,220	5,959	28
01646500	Potomac River near Washington, D.C.	11,560	[1]11,490	[1]1,740	61	+3	2,400	1,550	31
02105500	Cape Fear River at William O. Huske Lock near Tarheel, N.C.	4,810	5,005	982	49	−11	1,090	704	31
02131000	Pee Dee River at Peedee, S.C.	8,830	9,851	2,220	48	+1	2,340	1,512	30
02226000	Altamaha River at Doctortown, Ga.	13,600	13,880	1,965	38	−36	1,810	1,169	28
02320500	Suwannee River at Branford, Fl.	7,880	6,987	2,910	64	−25	2,770	1,790	31
02358000	Apalachicola River at Chattahoochee, Fl.	17,200	22,570	5,200	48	−21	4,930	3,186	31
02467000	Tombigbee River at Demopolis lock and dam near Coatopa, Ala.	15,400	23,300	5,002	128	+80	3,450	2,229	31
02489500	Pearl River near Bogalusa, La.	6,630	9,768	2,074	98	+17	1,870	1,208	31
03049500	Allegheny River at Natrona, Pa.	11,410	[1]19,480	[1]20,400	290	+259	8,030	5,189	27
03085000	Monongahela River at Braddock, Pa.	7,337	[1]12,510	[1]9,180	237	+115	4,550	2,940	27
03193000	Kanawha River at Kanawha Falls, W.Va.	8,367	12,590	4,725	78	+1	3,500	2,260	28
03234500	Scioto River at Higby, Ohio	5,131	4,547	5,080	668	+206	2,340	1,512	31
03294500	Ohio River at Louisville, Ky.[2]	91,170	116,00	86,780	244	+113	27,000	17,500	29
03377500	Wabash River at Mount Carmel, Ill.	28,635	27,220	20,030	290	+212	14,000	9,000	31
03469000	French Broad River below Douglas Dam, TN.	4,543	6,798	1,721	46	−27	...	...	..
04084500	Fox River at Rapide Croche Dam, near Wrightstown, Wis.[2]	6,150	4,163	13,233	594	+42	10,730	6,934	31
04264331	St. Lawrence River at Cornwall, Ontario–near Massena, N.Y.[3]	299,000	242,700	323,900	128	−1	340,000	220,000	31
02NG001	St. Maurice River at Grand Mere, P.Q.	16,300	25,150	31,800	167	+33	19,700	12,730	31
05082500	Red River of the North at Grand Forks, N.Dak.	30,100	2,551	3,356	249	+6	2,300	1,490	24
05133500	Rainy River at Manitou Rapids, Minn.	19,400	11,830	8,330	77	+17	8,040	5,196	23
05330000	Minnesota River near Jordan, Minn.	16,200	3,402	13,490	1,285	+31	8,770	5,668	31
05331000	Mississippi River at St. Paul, Minn.	36,800	[1]10,610	37,740	578	+7	24,400	15,770	31
05365500	Chippewa River at Chippewa Falls, Wis.	5,600	5,100	9,943	359	−11	5,200	3,360	31
05407000	Wisconsin River at Muscoda, Wis.	10,300	8,617	25,410	468	+65	9,620	6,217	31
05446500	Rock River near Joslin, Ill.	9,551	5,873	17,100	520	+121	13,300	8,600	31
05474500	Mississippi River at Keokuk, Iowa	119,000	62,620	215,400	611	+121	158,600	102,510	31
06214500	Yellowstone River at Billings, Mont.	11,796	7,038	5,060	120	−6	4,690	3,031	31
06934500	Missouri River at Hermann, Mo.	524,200	79,490	289,600	482	+171	230,000	149,000	31
07289000	Mississippi River at Vicksburg, Miss.[4]	1,140,500	576,600	905,000	307	+204	929,000	600,400	27
07331000	Washita River near Dickson, Okla.	7,202	1,368	6,606	1,273	+474	6,500	4,200	28
08276500	Rio Grande below Taos Junction Bridge, near Taos, N.Mex.	9,730	725	884	319	+73	1,010	652	31
09315000	Green River at Green River, Utah	40,600	6,298	5,927	207	+57	5,900	3,810	22
11425500	Sacramento River at Verona, Calif.	21,257	18,820	12,725	120	−24	9,700	6,270	28
13269000	Snake River at Weiser, Idaho	69,200	18,050	23,300	160	+35	24,700	15,960	31
13317000	Salmon River at White Bird, Idaho	13,550	11,250	5,610	113	−4	5,770	3,729	31
13342500	Clearwater River at Spalding, Idaho	9,570	15,480	4,280	114	−62	4,390	2,837	31
14105700	Columbia River at The Dalles, Oreg.[5]	237,000	[1]193,100	[1]122,600	134	+59	142,900	92,360	31
14191000	Willamette River at Salem, Oreg.	7,280	[1]23,510	[1]6,890	102	+25	15,500	10,020	31
15515500	Tanana River at Nenana, Alaska	25,600	23,460	19,130	123	−43	13,000	8,400	31
08MF005	Fraser River at Hope, B.C.	83,800	96,290	52,610	72	−23	46,610	30,120	31

[1]Adjusted.
[2]Records furnished by Corps of Engineers.
[3]Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y. when adjusted for storage in Lake St. Lawrence.
[4]Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.
[5]Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.

Provisional data; subject to revision

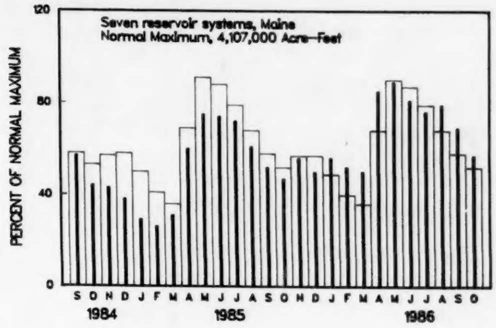
USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF OCTOBER 1986

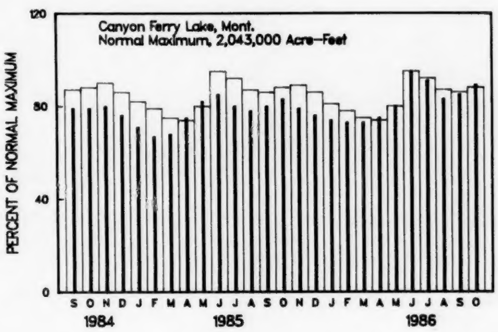
[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

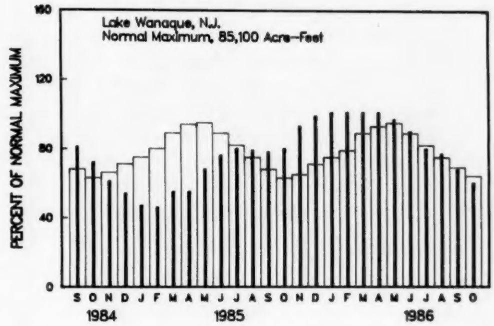
Reservoir Principal uses: F-Flood control I-Irrigation M-Municipal P-Power R-Recreation W-Industrial	Percent of normal maximum				Normal maximum (acre-feet)[a]
	End of Oct. 1986	End of Oct. 1985	Average for end of Oct.	End of Sept. 1986	
NOVA SCOTIA					
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs(P)	41	17	35	35	[b]226,300
QUEBEC					
Allard (P)	79	81	59	79	280,600
Gouin (P)	93	80	68	*88	6,954,000
MAINE					
Seven reservoir systems (MP)	57	47	52	69	4,107,000
NEW HAMPSHIRE					
First Connecticut Lake (P)	73	64	73	80	76,450
Lake Francis (FPR)	82	78	76	85	99,310
Lake Winnipesaukee (PR)	72	54	57	80	165,700
VERMONT					
Harriman (P)	62	78	61	74	116,200
Somerset (P)	78	73	68	80	57,390
MASSACHUSETTS					
Cobble Mountain and Borden Brook (MP)	69	65	71	72	77,920
NEW YORK					
Great Sacandaga Lake (FPR)	74	65	54	84	786,700
Indian Lake (FMP)	73	92	56	85	103,300
New York City reservoir system (MW)	74	52	65	81	1,680,000
NEW JERSEY					
Wanaque (M)	60	80	64	68	85,100
PENNSYLVANIA					
Allegheny (FPR)	38	29	33	43	1,180,000
Pymatuning (FMR)	85	87	79	93	188,000
Raystown Lake (FR)	65	65	56	65	761,900
Lake Wallenpaupack (PR)	55	70	49	57	157,800
MARYLAND					
Baltimore municipal system (M)	55	72	84	57	261,900
NORTH CAROLINA					
Bridgewater (Lake James) (P)	92	91	81	91	288,800
Narrows (Badin Lake) (P)	84	90	94	80	128,900
High Rock Lake (P)	58	64	58	65	234,800
SOUTH CAROLINA					
Lake Murray (P)	83	86	64	86	1,614,000
Lakes Marion and Moultrie (P)	83	80	67	78	1,862,000
SOUTH CAROLINA—GEORGIA					
Clark Hill (FP)	31	64	55	34	1,730,000
GEORGIA					
Burton (PR)	96	96	67	97	104,000
Sinclair (MPR)	87	87	77	86	214,000
Lake Sidney Lanier (FMPR)	35	48	52	32	1,686,000
ALABAMA					
Lake Martin (P)	78	87	68	79	1,375,000
TENNESSEE VALLEY					
Clinch Projects: Norris and Melton Hill Lakes (FPR)	29	27	33	35	2,293,000
Douglas Lake (FPR)	19	18	24	22	1,394,000
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR)	52	53	49	52	1,012,000
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR)	45	42	40	50	2,880,000
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR)	38	29	47	38	1,478,000
WISCONSIN					
Chippewa and Flambeau (PR)	91	92	78	86	365,000
Wisconsin River (21 reservoirs) (PR)	92	92	65	90	399,000
MINNESOTA					
Mississippi River headwater system (FMR)	36	32	29	41	1,640,000
NORTH DAKOTA					
Lake Sakakawea (Garrison) (FIPR)	93	82	89	97	22,700,000
SOUTH DAKOTA					
Angostura (I)	90	47	72	81	127,600
Belle Fourche (I)	51	12	35	44	185,200
Lake Francis Case (FIP)	65	59	58	79	4,834,000
Lake Oahe (FIP)	87	76	. . .	89	22,530,000
Lake Sharpe (FIP)	99	100	96	99	1,725,000
Lewis and Clark Lake (FIP)	94	94	95	94	477,000
NEBRASKA					
Lake McConaughy (IP)	78	76	68	78	1,948,000
OKLAHOMA					
Eufaula (FRP)	124	109	86	92	2,378,000
Keystone (FPR)	149	98	85	126	661,000
Tenkiller Ferry (FPR)	139	110	90	108	628,200
Lake Altus (FIMR)	100	14	45	43	133,000
Lake O'The Cherokees (FPR)	111	106	82	96	1,492,000
OKLAHOMA—TEXAS					
Lake Texoma (FMPRW)	108	102	93	98	2,722,000
TEXAS					
Bridgeport (IMW)	92	81	47	90	386,400
Canyon (FMR)	104	105	76	99	385,600
International Amistad (FIMPW)	81	72	84	64	3,497,000
International Falcon (FIMPW)	47	38	75	42	2,668,000
Livingston (IMW)	101	95	85	101	1,788,000
Possum Kingdom (IMPRW)	97	95	99	97	570,200
Red Bluff (PI)	63	21	26	61	307,000
Toledo Bend (P)	85	83	79	88	4,472,000
Twin Buttes (FIM)	41	11	29	31	177,800
Lake Kemp (IMW)	124	93	85	104	268,000
Lake Meredith (FWM)	27	31	38	28	796,900
Lake Travis (FIMPRW)	105	86	80	91	1,144,000
MONTANA					
Canyon Ferry (FIMPR)	89	83	88	85	2,043,000
Fort Peck (FPR)	85	75	86	84	18,910,000
Hungry Horse (FIPR)	80	77	88	87	3,451,000
WASHINGTON					
Ross (PR)	89	89	86	92	1,052,000
Franklin D. Roosevelt Lake (IP)	99	94	102	99	5,022,000
Lake Chelan (PR)	83	81	74	94	676,100
Lake Cushman (PR)	55	74	85	68	359,500
Lake Merwin (P)	104	99	87	101	245,600
IDAHO					
Boise River (4 reservoirs) (FIP)	54	49	48	51	1,235,000
Coeur d'Alene Lake (P)	53	66	54	86	238,500
Pend Oreille Lake (FP)	48	61	69	80	1,561,000
IDAHO—WYOMING					
Upper Snake River (8 reservoirs) (MP)	57	45	51	62	4,401,000
WYOMING					
Boysen (FIP)	90	78	83	91	802,000
Buffalo Bill (IP)	63	59	74	62	421,300
Keyhole (F)	34	29	43	33	193,800
Pathfinder, Seminoe, Alcova, Kortes, Glendo, and Guernsey Reservoirs (I)	66	57	46	66	3,056,000
COLORADO					
John Martin (FIR)	62	77	13	58	364,400
Taylor Park (IR)	72	66	55	77	106,200
Colorado-Big Thompson project (I)	82	54	55	82	730,300
COLORADO RIVER STORAGE PROJECT					
Lake Powell; Flaming Gorge, Fontenelle, Navajo, and Blue Mesa Reservoirs (IFPR)	92	90	. . .	93	31,620,000
UTAH—IDAHO					
Bear Lake (IPR)	84	78	60	89	1,421,000
CALIFORNIA					
Folsom (FIP)	57	52	55	65	1,000,000
Hetch Hetchy (MP)	67	55	50	77	360,400
Isabella (FIR)	48	34	26	58	568,100
Pine Flat (FI)	53	26	40	56	1,001,000
Clair Engle Lake (Lewiston) (P)	75	67	70	78	2,438,000
Lake Almanor (P)	75	58	51	82	1,036,000
Lake Berryessa (FIMW)	85	74	74	86	1,600,000
Millerton Lake (FI)	28	36	34	32	503,200
Shasta Lake (FIPR)	72	48	64	74	4,377,000
CALIFORNIA—NEVADA					
Lake Tahoe (IPR)	75	56	49	80	744,600
NEVADA					
Rye Patch (I)	66	55	57	70	194,300
ARIZONA—NEVADA					
Lake Mead and Lake Mohave (FIMP)	92	93	71	92	27,970,000
ARIZONA					
San Carlos (IP)	66	83	18	64	935,100
Salt and Verde River system (IMPR)	79	80	38	79	2,019,100
NEW MEXICO					
Conchas (FIR)	87	85	79	87	330,100
Elephant Butte and Caballo (FIPR)	94	86	30	94	2,442,000

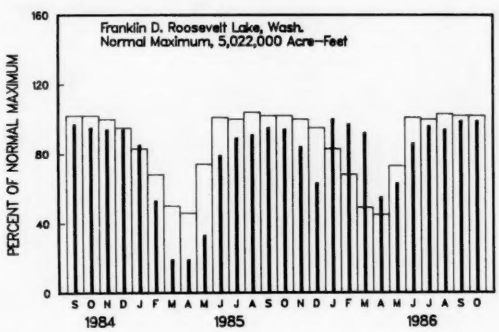
[a] 1 acre-foot = 0.04356 million cubic feet = 0.326 million gallons = 0.504 cubic feet per second day.
[b] Thousands of kilowatt-hours (the potential electric power that could be generated by the volume of water in storage).
*Corrected figure.

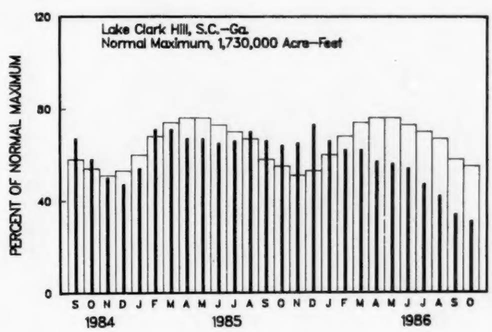
USABLE CONTENTS OF SELECTED RESERVOIRS AND RESERVOIR SYSTEMS

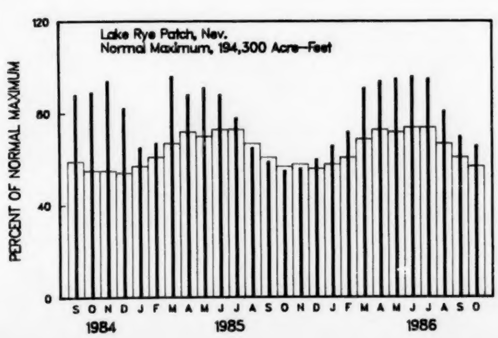


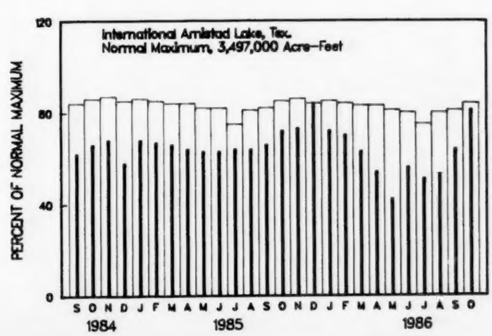










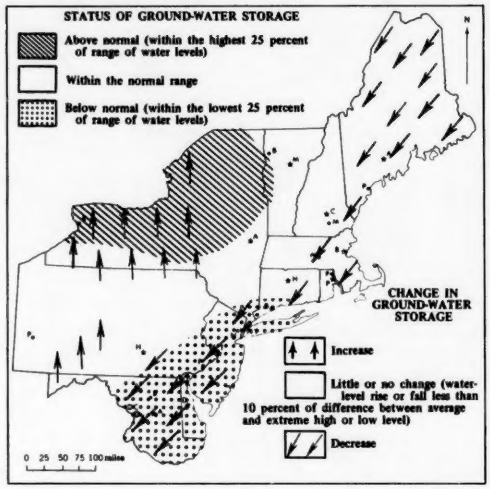


GROUND-WATER CONDITIONS DURING OCTOBER 1986

Ground-water levels continued to decline in coastal States of the Northeast region but began to rise in parts of New York State and Pennsylvania. (See map.) Near end of October, below-average levels persisted in Delaware, most of Maryland and New Jersey, and on Long Island, New York. In two observation wells in Delaware and Maryland, levels were at or close to the lowest of record of the past 30 years. In contrast to these conditions, ground-water levels remanined above average in most of New York State.

In the Southeastern States, ground-water levels rose in Louisiana and Mississippi, and declined in Virginia. Trends were mixed in other Southeastern States. Water levels were above average in Kentucky, and below average in Virginia, Arkansas, and Florida. Levels were mixed with respect to average in other States. A new low ground-water level for October was recorded in the key well at Memphis, Tennessee, despite a slight net rise during the month. A new October low was recorded also in the Cockspur Island key well near Savannah, despite a net rise of a fraction of a foot during the month.

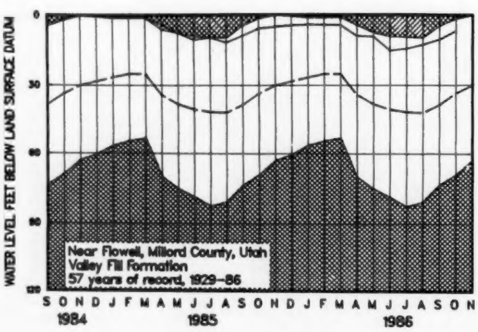
In the central and western Great Lakes States, ground-water levels rose in Wisconsin and Iowa, and mostly rose in Michigan. Levels declined in Ohio, and trends were mixed in Minnesota. Water levels were above average in Minnesota, Michigan, and Iowa, and near or above average in Wisconsin. Levels were mixed with respect to average in Indiana and Ohio. Two new October high levels were reached in Michigan, and a new October high was recorded in Iowa.

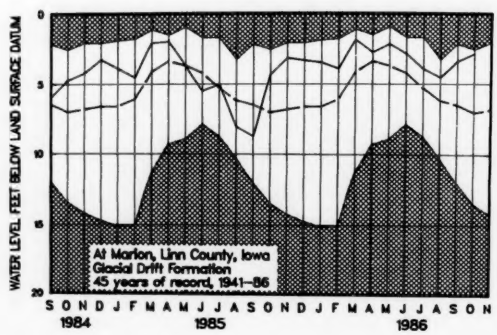


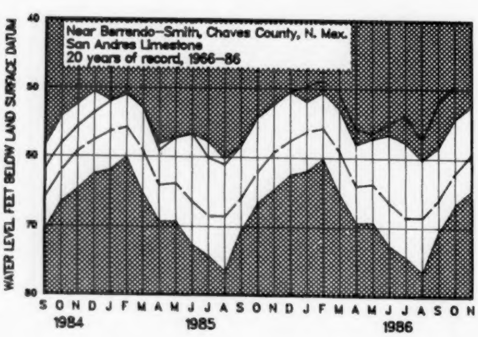
Map showing ground-water storage near end of October and change in ground-water storage from end of September to end of October.

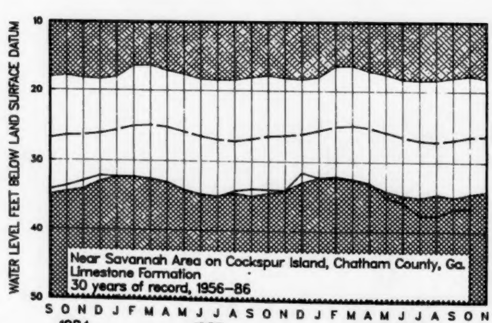
MONTH-END GROUND-WATER LEVELS IN KEY WELLS

Unshaded area indicates range between highest and lowest record for the month. Dashed line indicates average of monthly levels in previous years. Heavy line indicates level for current period.









In the Western States, ground-water levels rose in Washington, North Dakota, Kansas, and New Mexico, and declined in southern California. Trends were mixed in other Western States. Water levels were above average in North Dakota and Nebraska, below average in Arizona, and mixed with respect to average in other States. New high ground-water levels for October were reached in key wells in North Dakota, Nebraska, Nevada, and New Mexico. A new October low level was reached in the El Paso key well in western Texas.

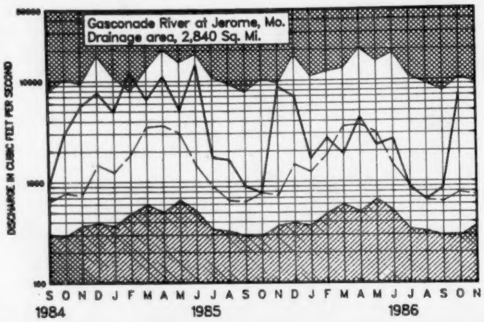
Provisional data; subject to revision

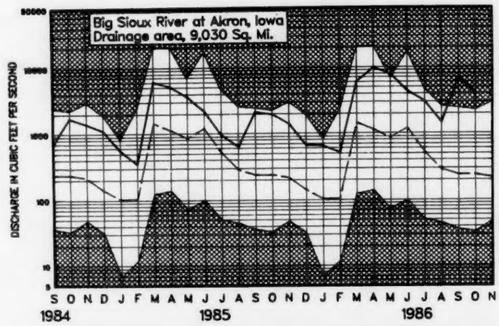
WATER LEVELS IN KEY OBSERVATION WELLS IN SOME REPRESENTATIVE AQUIFERS IN THE CONTERMINOUS UNITED STATES—OCTOBER 1986

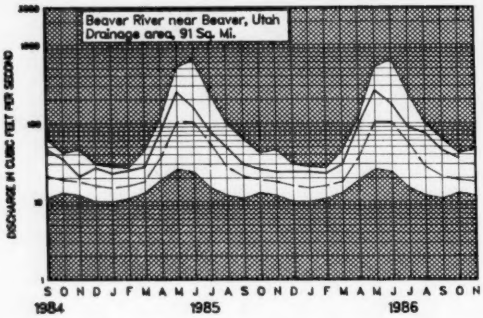
Aquifer and Location	Water level in feet with reference to land-surface datum	Departure from average in feet	Net change in water level in feet since:		Year records began	Remarks
			Last month	Last year		
Glacial drift at Hanska, south-central Minnesota.	−4.81	+3.75	−2.16	−0.81	1942	
Glacial drift at Roscommon in north-central part of Lower Peninsula, Michigan.	−3.42	+1.55	+0.65	+0.57	1935	October high.
Glacial drift at Marion, Iowa	−2.95	+3.83	+0.48	+1.44	1941	
Glacial drift at Princeton in northwestern Illinois.	−7.90	+6.61	+2.21	+4.30	1943	
Petersburg Granite, southeastern Piedmont near Fall Zone, Colonial Heights, Virginia.	−16.51	−0.19	−0.66	−0.74	1939	
Glacial outwash sand and gravel, Louisville, Kentucky (U.S. well no. 2).	−18.10	+7.14	−0.19	−1.17	1946	
500-foot sand aquifer near Memphis, Tennessee (U.S. well no. 2).	−106.16	−15.79	+0.07	−1.68	1941	October low.
Granite in eastern Piedmont Province, Chapel Hill, North Carolina (U.S. well no. 5).	−45.23	−2.23	−0.98	−2.01	1931	
Sparta Sand in Pine Bluff industrial area, Arkansas.	−221.40	−15.77	−1.50	−3.75	1958	
Eutaw Formation in the City of Montgomery, Alabama (U.S. well no. 4).	−27.1	−4.1	+1.0	−5.4	1952	
Limestone aquifer on Cockspur Island, Savannah area, Georgia (U.S. well no. 6).	−36.56	+9.40	+0.14	+2.43	1956	October low.
Sand and gravel in Puget Trough, Tacoma, Washington.	−103.12	+3.01	+0.56	−0.14	1952	
Pleistocene glacial outwash gravel, North Pole, northern Idaho (U.S. well no. 3).	−462.4	−2.9	−0.4	−3.5	1929	
Snake River Group: Snake River Plain Aquifer, at Eden, Idaho (U.S. well no. 4).	−118.1	−3.1	−0.1	+0.3	1957	
Alluvial valley fill in Flowell area, Millard County, Utah (U.S. well no. 9).	−6.48	+25.82	+3.92	−0.98	1929	
Alluvial sand and gravel, Platte River Valley, Ashland, Nebraska (U.S. well no. 6).	−0.83	+5.64	+2.29	+4.87	1935	October high.
Alluvial valley fill in Steptoe Valley, Nevada	−8.04	+5.13	+0.53	+0.40	1950	October high.
Pleistocene terrace deposits in Kansas River valley, at Lawrence, northeastern Kansas.	−15.57	+5.08	+3.33	−0.66	1953	
Alluvium and Paso Robles clay, sand, and gravel, Santa Maria Valley, California	−119.00	+22.91	−4.32	−4.43	1957	
Valley fill, Elfrida area, Douglas, Arizona (U.S. well no. 15).	−104.0	−23.2	+4.5	+1.0	1951	
Hueco bolson, El Paso area, Texas	−267.13	−19.29	−0.45	−2.09	1965	October low.
Evangeline aquifer, Houston area, Texas	−318.22	−12.45	+4.44	+2.36	1965	

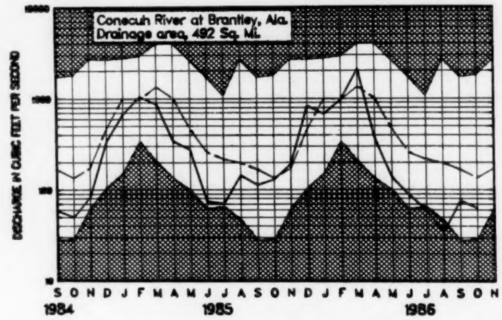
MONTHLY MEAN DISCHARGE OF SELECTED STREAMS

Unshaded area indicates range between highest and lowest record for the month. Dashed line indicates median of monthly values for reference period, 1951-80. Heavy line indicates mean for current period.









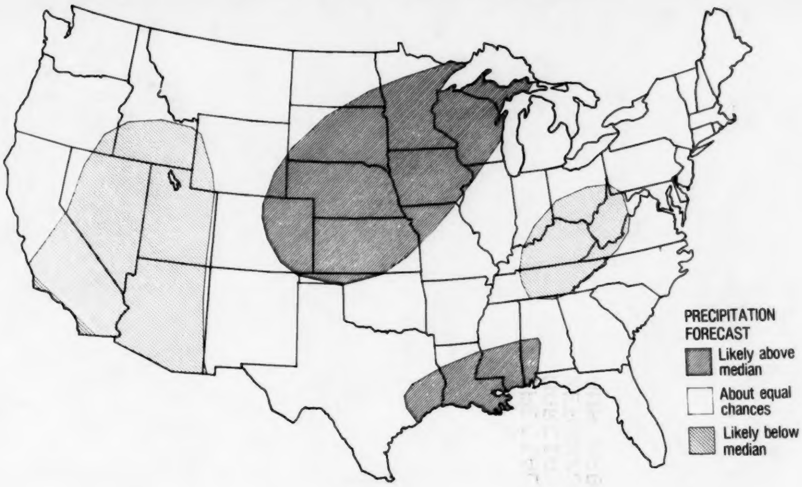
Provisional data; subject to revision

DISSOLVED SOLIDS AND WATER TEMPERATURES, FOR OCTOBER 1986, AT DOWNSTREAM SITES ON SIX LARGE RIVERS

Station number	Station name	October data of following calendar years	Stream discharge during month	Dissolved-solids concentration[a]		Dissolved-solids discharge[a]			Water temperature[b]		
			Mean (cfs)	Minimum (mg/L)	Maximum (mg/L)	Mean (tons per day)	Minimum (tons per day)	Maximum (tons per day)	Mean in °C	Minimum, in °C	Maximum, in °C
01463500	Delaware River at Trenton, NJ	1986	4,070	93	125	1,246	972	2,424	16.0	12.5	23.0
	(Morrisville, PA).	1944—85	6,649	58	156	. . . .	463	8,300	. . .	8.5	25.5
		(Extreme yr)		(1945)	(1953)		(1963)	(1955)			
			[c]4,918								
04264331	St. Lawrence River at Cornwall,	1986	*323,900	. 9. .	. .	. .	. . .	. . .	. . .	. . .	. . .
	Ontario, near Massena, NY	1975—85	285,300	164	168	127,400	115,000	138,000	13.5	8.5	19.5
	(median streamflow at	(Extreme yr)		(d)	(d)		(d)	(1977)			
	Ogdensburg, NY).		[c]253,600								
07289000	Mississippi River at	1986	904,700	187	272	522,500	336,900	639,700	20.5	16.0	26.0
	Vicksburg, MS.	1975—85	362,700	183	337	232,500	117,000	440,000	20.0	15.0	26.0
		(Extreme yr)		(1979,	(1983)		(1976)	(1985)			
			[c]295,000	1982)							
03612500	Ohio River at lock and dam 53,	1986	127,000	189	229	. . . .	37,800	144,000	. . .	19.0	25.0
	near Grand Chain, IL (stream-	1954—85	117,600	135	330	. . . .	11,900	262,000	. . .	12.0	26.0
	flow station at Metropolis, IL).	(Extreme yr)		(d)	(1967)		(1985)	(1976)			
			[c]96,680								
06934500	Missouri River at Hermann,	1986	290,000	168	341	204,000	160,000	272,000	16.0	15.0	17.0
	MO (60 miles west of	1975—85	72,290	211	558	79,820	51,800	163,000	16.5	10.0	22.5
	St. Louis, MO).	(Extreme yr)		(1985)	(1980)		(1976)	(1985)			
			[c]60,140								
14128910	Columbia River at Warrendale,	1986	119,000	102	114	35,100	25,200	43,000	15.5	14.0	16.5
	OR (streamflow station at	1975—85	117,700	73	117	31,100	13,200	48,900	15.5	11.0	19.5
	The Dalles, OR).	(Extreme yr)		(1981)	(1977)		(1981)	(1973)			
			[c]91,570								

[a]Dissolved-solids concentrations, when not analyzed directly, are calculated on basis of measurements of specific conductance.
[b]To convert °C to °F: [(1.8 X °C) + 32] = °F.
[c]Median of monthly values for 30-year reference period, water years 1951—80, for comparison with data for current month.
[d]Occurred several years.
*Dissolved solids and water-temperature records are not available for October.

Precipitation Forecast for November 1986 through January 1987



NATIONAL WATER CONDITIONS

November 1986

Based on reports from the Canadian and U.S. Field offices; completed November 14, 1986

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EXPLANATION OF DATA (Revised August 1986)

Cover map shows generalized pattern of streamflow for the month based on provisional data from 184 index gaging stations—18 in Canada, 164 in the United States, and 2 in the Commonwealth of Puerto Rico. Alaska, Hawaii, and Puerto Rico inset maps show streamflow only at the index gaging stations that are located near the point shown by the arrows. Classifications on map are based on comparison of streamflow for the current month at each index station with the flow for the same month in the 30-year reference period, 1951-80. Shorter reference periods are used for one Canadian index station, two Kansas index stations, one New York index station, and the Puerto Rico index stations because of the limited records available.

The comparative data are obtained by ranking the 30 flows for each month of the reference period in order of decreasing magnitude—the highest flow is given a ranking of 1 and the lowest flow is given a ranking of 30. Quartiles (25-percent points) are computed by averaging the 7th and 8th highest flows (upper quartile), 15th and 16th highest flows (middle quartile and median), and the 23rd and 24th highest flows (lower quartile). The upper and lower quartiles set off the highest 25 percent of flows and lowest 25 percent of flows, respectively, for the reference period. The median (middle quartile) is the middle value by definition. For the reference period, 50 percent of the flows are greater than the median, 50 percent are less than the median, 50 percent are between the upper and lower quartiles (in the normal range) 25 percent are greater than the upper quartile (above normal), and 25 percent are less than the lower quartile (below normal). Flow for the current month is then classified as; *above normal* if it is greater than the upper quartile, *in the normal range* if it is between the upper and lower quartiles, and *below normal* if it is less than the lower quartile. Change in flow from the previous month to the current month is classified as *seasonal* if the change is in the same direction as the change in the median. If the change is in the opposite direction of the change in the median, the change is classified as *contraseasonal* (opposite to the seasonal change). For example: at a particular index station, the January median is greater than the December median; if flow for the current January increased from December (the previous month), the increase is seasonal; if flow for the current January decreased from December, the decrease is contraseasonal.

Flood frequency analyses define the relation of flood peak magnitude to probability of occurrence or recurrence interval. *Probability of occurrence* is the chance that a given flood magnitude will be exceeded in any one year. *Recurrence interval* is the reciprocal of probability of occurrence and is the *average* number of years between occurrences. For example, a flood having a probability of occurrence of 0.01 (1 percent) has a recurrence interval of 100 years. *Recurrence intervals imply no regularity of occurrence;* a 100-year flood might be exceeded in consecutive years or it might not be exceeded in a 100-year period.

Statements about *ground-water levels* refer to conditions near the end of the month. The water level in each key observation well is compared with average level for the end of the month determined from the 30-year reference period, 1951-80, or from the entire past record for that well when only limited records are available. Comparative data for ground-water levels are obtained in the same manner as comparative data for streamflow. *Changes in ground-water levels,* unless described otherwise, are from the end of the previous month to the end of the current month.

Dissolved solids and temperature data for September are given for six stream-sampling sites that are part of the National Stream Quality Accounting Network (NASQAN). *Dissolved solids* are minerals dissolved in water and usually consist predominately of silica and ions of calcium, magnesium, sodium, potassium, carbonate, bicarbonate, sulfate, chloride, and nitrate. *Dissloved-solids discharge* represents the total daily amount of dissolved minerals carried by the stream. *Dissolved-solids concentrations* are generally higher during periods of low streamflow, but the highest dissolved-solids *discharges* occur during periods of high streamflow because the total quantities of water, and therefore total load of dissolved minerals, are so much greater than at times of low flow.

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